STRATEGY RESEARCH PROJECT

SPACE, LITTLE ROUND TOP 2063

BY

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ABSTRACT

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As we transition to the 21st Century the speed and lethality of the battlefield will significantly increase. The Army must leverage space based systems for targeting at the operational and tactical levels. Space based sensors linked directly to shooters will provide US forces the ability to maintain full spectrum dominance through dominant maneuver and precision engagement.

This paper links the future of joint operations through Joint Vision 2010, Army Vision 2010, and the United States Space Command's (USSPACECOM) Long Range Plan Implementing USSPACECOM Vision for 2020. All three of these visions move us closer to providing space based support directly to the operational and tactical commander.

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Over the past two centuries the art of war has dramatically changed. We have gone from the musket and telegraph to the laser beam and satellite. As we move into the 21st Century we are entering what some people call the Revolution in Military Affairs (RMA).

Part of the RMA is the use of space. Commanders will be able to destroy targets at greater ranges with more precision than any force since the beginning of warfare. Space is a key enabler which will provide commanders this capability.

As we transition to the 21st Century the speed and lethality of the battlefield will significantly increase. The Army must leverage space based systems for targeting at the operational and tactical levels. Space based sensors linked directly to shooters will provide US forces the ability to maintain full spectrum dominance through dominant maneuver and precision engagement.

This paper will link the future of joint operations through Joint Vision 2010, Army Vision 2010, and United States Space Command's (USSPACECOM) Long Range Plan Implementing USSPACECOM Vision for 2020. All three of these visions move us closer to providing space based support directly to the operational and tactical commander.

While looking for an azimuth into the future, I also look to the past for a foundation in historical examples. The concept of precision engagement and dominant maneuver linked by a system of command and control can be traced back to the very beginning of our Army.

Lessons from the past and visions of our future lead us to space as a new frontier for our Army. To not take advantage of space based capabilities would be similar to ignoring the relevance of rifled artillery and the telegraph during the Civil War. Space will be the enabler which revolutionizes warfare in the 21st Century.

SPACE AND JOINT VISION 2010

To fully understand how the use of space will impact virtually all aspects of military operations you must understand how USSPACECOM's Vision for 2020 links to Joint and Army Vision 2010 for future operations.

Before we discuss the operational framework outlined in Joint Vision 2010, we must first understand the future threat and battlespace we will potentially fight in. Just as we are leveraging technology, we must assume our future adversaries will also take advantage of technology making rapid improvements in their capabilities. The use of Weapons of Mass Destruction (WMD), along with asymmetrical threats, pose new challenges to our future force.[1]

We must assume that the technologies that we are developing now will be in the hands of our adversaries by the year 2010. With that, our future battlespace will be much more lethal.

Technology, in the hands of our adversaries, will increase the importance of force protection. We must be prepared to adapt to a more lethal battlespace. Technology will increase the importance of stealth, mobility, dispersion, and the pursuit of a higher operational tempo.[2] Joint Vision 2010 lays out an

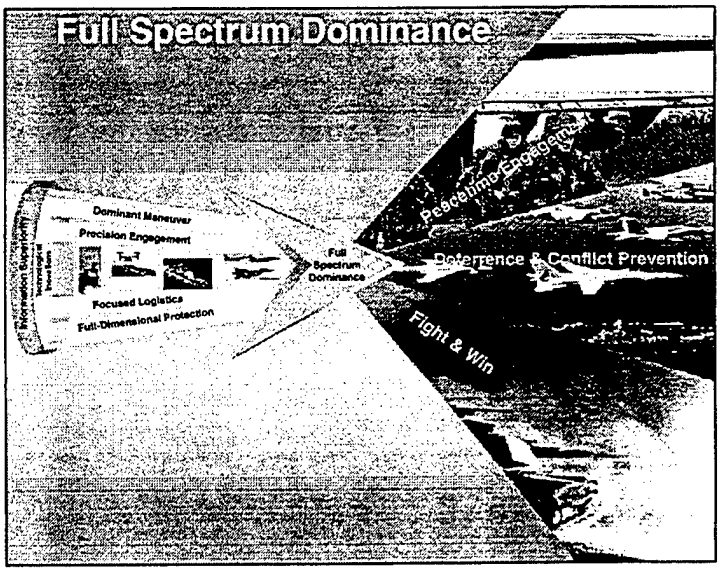

Figure 1
(Joint Vision 2010, page 30)

operational framework to counter potential threats while leveraging our technological advantages.

To understand the use of space in future operations, you must first understand the operational concepts of information superiority, dominant maneuver, precision engagement, focused logistics, and full-dimensional protection. Space will play a key role in each of these areas.

DOMINANT MANEUVER

Dominant maneuver is the multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish the assigned operational tasks.[3] The positional advantage gained by dominant maneuver will allow us to gain decisive advantage over the entire battlespace.

PRECISION ENGAGEMENT

Precision engagement will allow our forces to locate the objective or target, provide responsive command and control, generate the desired effect, assess our level of success, and

retain the flexibility to reengage with precision when required. Precision engagement will give us the capability to shape our battlespace from extended ranges enhancing our force protection.[4]

FULL-DIMENSIONAL PROTECTION

Because of the more lethal battlespace described earlier we must be able to protect and thus preserve the force. In order to provide this level of protection we must be able to control the battlespace to ensure our forces are able to maintain freedom of action during deployment, maneuver, and engagement.[5] The preservation of the force will allow commanders to mass the effects of dispersed forces at the critical place and time within the battlespace.

FOCUSED LOGISTICS

In order to conduct all of the preceding concepts we must have a flexible and highly responsive logistical system. Focused logistics is the fusion of information, logistics and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute. The results of such systems will be the delivery of key support directly to the strategic, operational and even tactical levels of operations.[6]

INFORMATION SUPERIORITY

Information superiority is the enabler which optimizes all other functions as we approach 2010. We must possess information superiority which is the capability to collect, process and disseminate an uninterrupted flow of information while denying our adversary's ability to do the same.[7]

The importance of information cannot be overstated. The flow of information is critical to our success within all of the operational concepts outlined in Joint Vision 2010. This criticality can also be seen as a vulnerability if not protected. Space will play a key role both in offensive and defense information operations.

FULL SPECTRUM DOMINANCE

The focus of dominant maneuver, precision engagement, full-dimensional protection and focused logistics is to maintain full spectrum dominance over our adversaries. This concept can be looked at from two perspectives.

First, within any conflict we must control all aspects of the battlefield thus dominating our opponent. Information operations will support our ability to target and attack with incredible precision. Our logistics support must minimize waste and allow for the precise flow of supplies to the right place at

the right time. Throughout the battlespace, forces are protected allowing for complete freedom of operations.

The second aspect of full spectrum dominance is our ability to support the full range of military operations. These operations can range from counterdrug operations to a major theater of war conflict. Space will play a key role within each of these concepts.

USSPACECOM VISION 2020

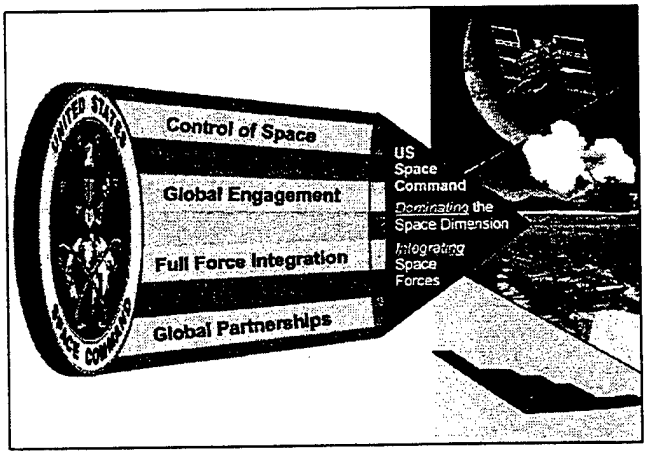

Figure 2
(USSPACECOM Long Range Plan, page 11)

In order to support Joint Vision 2010, USSPACECOM has developed its own vision outlining four operational concepts: control of space, global engagement, full force integration, and global partnerships. These concepts have been formulated within the context of three major assumptions.

First, that the United States does not expect to face a peer competitor within the next two decades. Second, that the United States dependency on space will rival its dependency on electricity and oil as we approach the year 2020. Finally, that

the growth of information and space capabilities has the potential to become a revolution in military affairs.[8]

Control of Space

Control of space is the ability to assure freedom of operations within the space medium, and if required deny others the use of space. Control of space requires USSPACECOM to achieve five major objectives: assure the means to get to space and operate once there, surveil to achieve and maintain situational awareness, protect our critical systems, prevent unauthorized access to US and allied space systems and negate hostile space systems that place US and allied interests at risk.[9]

Global Engagement

Global engagement is the combination of world wide situational awareness and precise application of force from space. This capability must be fully integrated to air, land, and sea forces. USCINCSPACE must be able to accomplish three key tasks to achieve global engagement: Surveil high interest areas, defend against ballistic and cruise missile attacks, and potentially hold at risk a finite number of high value targets with near instantaneous force application from space.[10]

Full Force Integration

Full force integration is the integration of space forces and space-derived information with air, land, and sea forces.

In order to accomplish complete integration USSPACECOM must develop policy and doctrine, train people on the use of space based systems, integrate space collected or transmitted information, and finally develop organizations which command and control spaced based assets and forces.[11]

Global Partnerships

Global partnerships is the concept which leverages military, civil, commercial, intelligence, national, and international space systems to strengthen Department of Defense (DOD) capabilities. Such partnerships will enhance military capabilities, strengthen alliances, reduce cost, and build confidence within coalitions.[12] Partnerships will ultimately enhance all aspects of space operations from control of space to global engagement to full force integration.

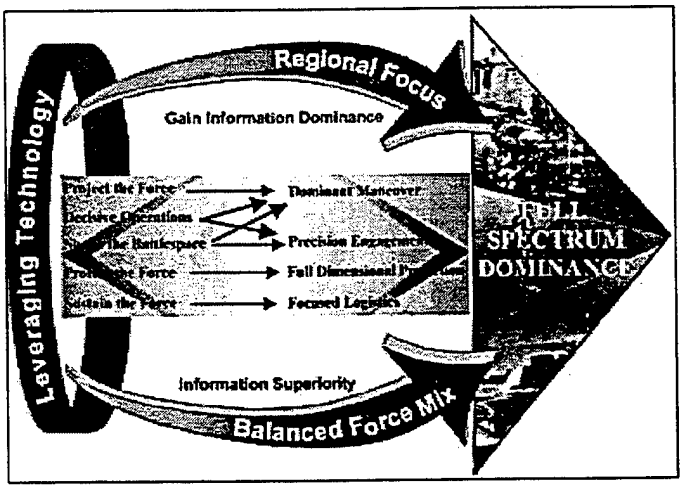

Figure 3
(Army Vision 2010, page 10)

ARMY VISION 2010

To fully understand the integration of space into the Army's future capability we must next explore the Army's Vision 2010. In addition to the five operational concepts outlined in Joint Vision

2010 the Army developed additional patterns of operations. The additional patterns are: project the force, decisive operations, shape the battlespace, protect the force, and sustain the force. Information dominance enables all of the patterns.[13] I have discussed the elements of Joint Vision 2010, so I will focus on the Army's patterns of decisive operations and shape the battlespace as they relate directly to the focus of this paper; the integration of space based systems.

Decisive Operations

Decisive operations are the means to achieving success. They force the enemy to give in to our will. Decisive operations are enabled by precision engagement, precise information, and precision detection. The Army will conduct decisive operations by positioning combat power throughout the battlefield.

The positioning of combat power throughout the battlefield does not necessarily mean positioning forces throughout the battlefield. What it does mean is by maintaining informational dominance and precision engagement the Army will be able to mass effects throughout the battlefield simultaneously. Critical to the success of decisive operations is the commander's ability to shape his battlespace.[14]

Shape the Battlespace

Shaping the battlespace, put very simply, sets the conditions for success. Shaping operations require the use of all combat multipliers to set the conditions for decisive operations. These operations begin early with Intelligence Preparation of the Battlefield (IPB). IPB allows the commander to decide what enemy high value targets to attack, align critical intelligence assets to detect those targets and ultimately deliver the correct munitions to achieve the desired affects. The final step in this process is the assessment of the affects achieved. This process is known within the Army as the targeting methodology.

The Army envisions key enablers to achieve the targeting methodology in the future as sensor to shooter links, simultaneous application of joint capabilities, and precision systems and munitions. Each of these will be reliant on space technology and capabilities.[15]

Now that I have discussed the precepts of Joint Vision 2010 and the concepts of USSPACECOM's Vision 2020 as well as Army Vision 2010, we must take a moment and crosswalk the three visions. My crosswalk will focus on information superiority, dominant maneuver, and precision engagement as they are the focus of this paper.

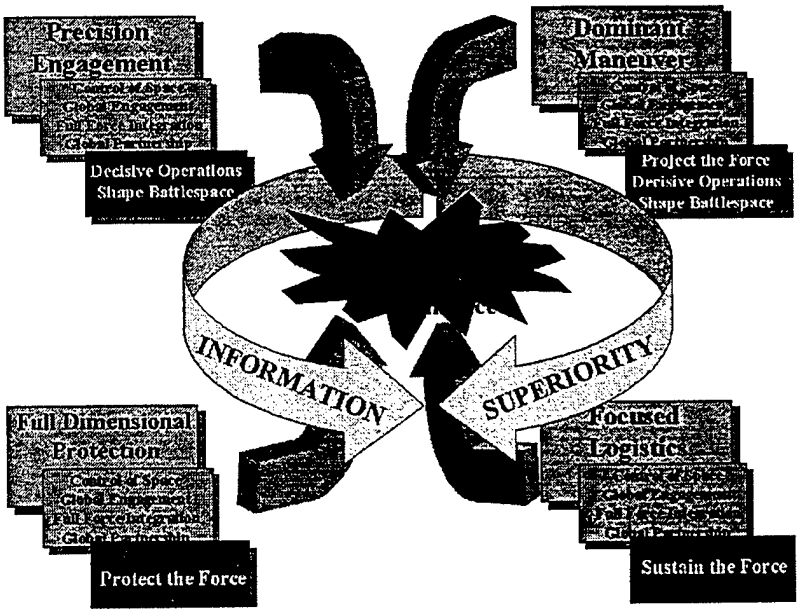

Figure 4

JOINT VISION CROSSWALK

Figure 4 depicts the crosswalk of Joint Vision 2010's operational concepts with USSPACECOM's Vision for 2020 and the Army's Vision 2010. Common to our ability to execute all elements of Joint Vision 2010 is maintaining information superiority. While I will go into depth in the concepts of precision engagement and dominant maneuver, all of the operational concepts outlined in JV 2010 are intertwined. Each has an impact on the other.

The concept of precision engagement is enabled by space within all four operational concepts outline in USSPACECOM's vision. Control of space will allow real time surveillance of targets and battle damage assessment. Space assets will be critical to winning the information war. Control of space must insure our uninterrupted access to space and protection of our space assets.

Within the concept of global engagement, combatants will be provided highly accurate targeting data against specific, high

value, targets. The combination of global engagement and precision long-range weapons give commanders the ability to strike throughout the depth of their battlespace.

Full force integration insures a common picture to all commanders throughout the battlespace. Space based communications and sensors will provide common weather, time, and navigation. Global partnership will enhance our capability to provide these capabilities through Civil Reserve Airlift Fleet (CRAF) like agreements with commercial providers.

The Army envisions precision engagement as a means to shape the battlespace. Shaping operations are enabled through sensor to shooter links and precision munitions with extended ranges. Space based sensors linked directly to precision weapons provide commanders the ability to strike throughout his area of operations. Critical targets can be attacked in support of early entry forces using space based sensors and long range attack weapons. These operations set the stage for dominant maneuver and decisive operations.

The concept of dominant maneuver is again supported through all four space based enablers: control of space, global engagement, full force integration, and global partnerships for many of the same reasons outlined in previous paragraphs. We must also look at the Army's concept of projecting the force.

The Army has added force projection as a concept within the constructs of dominant maneuver. The Army must project the force in order to conduct decisive operations. Space based communications, intelligence, and sensors are enablers which will allow the rapid, and safe, projection of combat forces and equipment. Once deployed the Army can transition to decisive operations.

Decisive operations, or operational maneuver as described in Army Vision 2010, is supported through shaping operations. As we approach 2010, operational maneuver will be directly supported using space based assets. The transition from primarily strategic support to operational and even tactical level maneuver will cause a significant change in how we fight. Sensor to shooter links, communications, navigation, weather and more will directly support the operational, and even tactical commanders, conducting decisive operations.

All of the operational concepts of Joint and Army Vision 2010 are enabled through information superiority. Information superiority and information dominance currently rely heavily on space based assets. They will become even more reliant on space in the future.

While the terms dominant maneuver, precision engagement, and information superiority are new, the concepts are not. If we

look back in our history we can see these concepts both applied and derived from lessons learned.

HISTORY

The concepts of precision engagement and dominant maneuver enabled through information superiority have been brought to the forefront through Joint Vision 2010, but their roots can be traced back to the very beginning of our nation. History provides superb examples of how information dominance linked with precision engagement allowed forces to execute dominant maneuver. There are also several examples of how the lack of information and inability to attack key targets with a sufficient level of precision caused stalemate, needless destruction, and hindered the use of the maneuver arm.

REVOLUTIONARY WAR

In the fall of 1776 George Washington's Colonial Army had been driven through New York and were being pushed back into New Jersey. In December, George Washington planned a daring attack across the Delaware River into Trenton.

On Christmas night 1776, Washington's force crossed the Delaware along with 18 pieces of field artillery. By 3 a.m. all of Washington's forces were across the river. The Prussian garrison was completely surprised by this bold attack. The Prussian's six cannons were neatly lined in front of the

commander's quarters providing a lucrative target for the Colonial gunners.

Washington's focus was on destroying the Prussian battery. As the Prussian force deployed to their guns they were killed by loads of Colonial canister. Once the Prussian artillery was eliminated, Colonial gunners targeted the wooden houses throughout the city housing the Prussian forces. The Prussian commander tried to rally his force but only met with volley after volley of Colonial canister rounds.[16]

By the end of the fight, 1000 Prussians were encircled. Washington's force suffered only 4 wounded during the engagement compared to the 22 killed/missing, 83 wounded, and 891 captured Prussians.[17] The engagement gave new life to the struggling Colonial force.

Within the context of Joint Vision 2010's operational concepts Washington was able to use an early entry force to conduct dominant maneuver combined with precision engagement to win a major victory with a numerically inferior force. His information superiority provided the key targeting necessary to employ his artillery in what would now be called precision engagements destroying the enemy's vital artillery and infantry.

CIVIL WAR

The next example can be seen on the second day of the Battle of Gettysburg, 2 July 1863. By the afternoon of the second day of the battle, the southern end of the Union line was located in the vicinity of Little Round Top. Through the course of the day only a signal detachment occupied this piece of key terrain. Seeing this error, General Warren rushed to the top of the hill with a brigade of infantry and six Perrot guns.

From Little Round Top, General Warren was able to use the range and accuracy of his artillery to dominate the battlefield and fire into the flank of the Confederate lines. While the fighting was fierce, the Confederate forces could not take the hill nor silence the battery.[18] The precision of the Perrot guns combined with superb targeting from Little Round Top were the key to success. While the massing of artillery and soldiers was the key in other segments of the battle, precision and the ability to target from critical information provided by key terrain, won the Battle of Little Round Top.

As with Washington's forces in Trenton almost a century earlier, dominant maneuver supported by precision engagement and information superiority won the day using a numerically inferior force. Over the next 50 years we saw a movement away from maneuver and precision which would lead us into the stalemates of World War I (WWI).

WORLD WAR I

As forces moved into WWI our ability to engage targets at much greater ranges significantly improved. With the increased range, fire support became more and more dependent on mass fires to account for the inaccuracy of delivery systems and target location.

By 1916, and the Battle of the Somme, artillery and logistics became the driving factor in planning a battle or campaign. British artillery prepared the battlefield for seven days prior to the offensive. Massed artillery was used to destroy obstacles and machine gun positions. This massive bombardment resulted in decimating the terrain, severely limiting the infantry's ability to advance. Maneuver became almost impossible.[19]

The effects of destruction fires drove both offensive and defensive planning. Offensive actions were not planned based on the availability of maneuver divisions but on the number of artillery tubes on hand. The requirement for artillery placed an incredible strain on the logistical systems to support the artillery with ammunition.

By the end of WWI, fires shifted away from destruction missions to what we now call direct support missions. The ability to provide more coordinated artillery support was

improved because of improved observation techniques, communications, and accuracy.

While improving, massed artillery was still required, placing a significant drain on the logistics system and restricted the commander's ability to maneuver on the battlefield.[20] The requirement to mass fires to gain necessary effects was carried throughout WWII.

WORLD WAR II

WWII saw the evolution of artillery and air delivered fire support. Both of these arms required the massing of tubes or planes in order to achieve desired results against point targets.

In 1944, following the Normandy invasion, the Allies built one of the most powerful invasion forces in the history of modern warfare. The Allies used both air and artillery to support the breakout. Neither of these arms could provide the accuracy needed to destroy point targets without massing bombers or artillery. This resulted in fire support overkill.

During Operation COBRA in July, 1944 Allies massed over 1,800 B-17s, 550 fighter bombers, and 1000 artillery tubes in order to force a breakout from the Normandy beaches. There were 111 Allied soldiers killed and 490 wounded from the bombardment.

While the massed fires eventually enabled the breakout, it was at a high cost in terms of lives and supplies.[21]

Just as in WWI, our inability to locate key targets and destroy them with reasonable accuracy forced commanders to rely on massed aerial and artillery fires. This resulted in friendly deaths as well as an overkill which delayed friendly maneuver. A significant change in the need for massed artillery fires would not be seen until Operations JUST CAUSE and DESERT STORM.

OPERATIONS JUST CAUSE / DESERT STORM

During Operations JUST CAUSE and DESERT STORM precision munitions were widely used. The results were unprecedented. During both operations, Army and Air Force precision munitions allowed detailed targeting with minimal collateral damage.

The combined attack from sea, air, and land attack systems set the conditions for the land component to successfully accomplish its missions with minimal casualties. The use of precision munitions allowed for the destruction of key enemy targets even within the confines of urban terrain with minimal civilian casualties.

ARMY AFTER NEXT

I have looked at our past, now I would like to look at our future beyond the year 2010. This time period is being called

the Army After Next (AAN). The implications of space become even greater as we move toward the year 2020 and beyond.

Speed at the operational and tactical level on the future battlefield will increase ten fold from current capabilities. This increase will be a result of increased tactical mobility and situational awareness. Information dominance must enable commanders to decrease their decision cycle to keep pace with the future battlefield. The ability to target and maneuver with precision and speed will set the stage of success.[22]

Just as we maneuver forces, we must also be capable of maneuvering the effects of precision fires. Because of the increased ranges of future systems our ability to target throughout a wide, and possible varied, battlespace will become more and more dependent on space based sensors with direct links to commanders at all levels. These forces may become smaller and more flexible.[23]

Opposing forces will disperse throughout the battlefield in order to counter U.S. targeting and deep strike capabilities. Enemy command and control will be facilitated using non-nodal communication systems. Because of the capabilities to target forces in open terrain these forces must be able to rapidly transition into restricted terrain such as urban or mountainous areas.[24]

Smaller hybrid forces leveraging technology will be used in order to keep pace with the speed, and size of the battlefield. We must be able to precisely target the enemy and rapidly maneuver throughout the battlefield. If the threat chooses to move into restricted terrain, such as urban areas, then it is critical that we are able to identify critical high value targets and destroy them without committing large forces into urban warfare.[25] Space based sensors and communications systems will be the enablers that allow us to conduct these types of precision strikes and maneuver operations.

TECHNICAL ADVANCES LEVERAGING SPACE

Now that we have looked at the vision of space as an enabler for future forces we must consider the technological advances which will allow the vision to become a reality. In this section we will look at some new systems that will provide the tactical and operational commander space based intelligence, targeting and communications support.

The first system we will discuss is the Discoverer II satellite constellation. This system is projected to place a global constellation of 24 satellites into orbit providing commanders capabilities never seen at the theater, operational, and tactical levels.

The Discoverer II will provide space based surveillance, near real time targeting, and global precision Digital Terrain Elevation Data (DTED). When needed, the system will have direct theater tasking control.[26] Discoverer II is the quick response system that will enable commanders

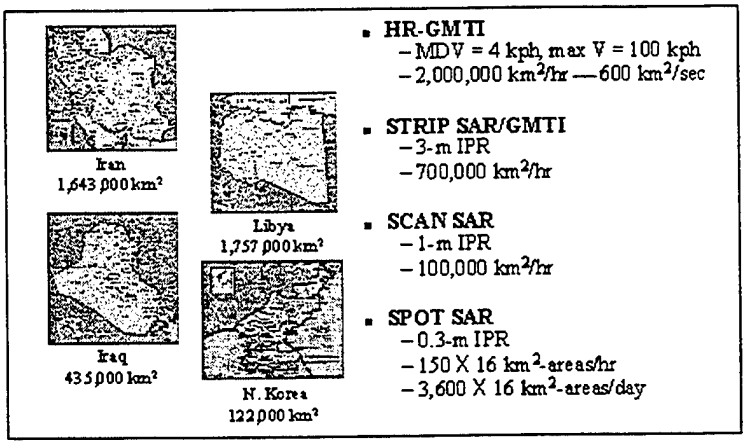

Figure 5

(Endnote #26)

in the 21st Century gain information superiority.

This constellation will provide both Synthetic Aperture Radar (SAR) and Ground Moving Target Indicator (GMTI) capabilities. Figure 5 shows examples of the SAR and GMTI capabilities provided to the commander using this all weather, day or night system.[27] Accuracy shown in Figure 5 is well within tolerance for current, and future, precision and brilliant munitions. Dwell time will give the commander almost continual coverage of a specific coverage area. Discoverer II will have two test satellites in orbit by 2004 for initial testing. The initial constellation should be in operation by 2009.

The Discoverer II represents one of the first space based surveillance systems that can be given to a CINC with tasking authority. With direct tasking capabilities, the CINC can determine priorities. With direct tasking capability comes the capability to align a key sensor to air, sea, and land based shooters. The combination of accuracy, speed, and command authority provides the CINC the capability to conduct precision engagement supporting dominant maneuver throughout his theater of operations.

While not space based assets, new High Altitude Endurance (HAE) Unmanned Aerial Vehicles (UAV) will provide commanders critical near real time targeting data. Systems such as Global Hawk will provide both SAR and GMTI data directly to theater

commanders. This system will depend on space based communication satellites to downlink data.

Global Hawk is a high altitude battlefield surveillance system which will provide an all weather day or night support to commanders. The system is designed to see objects as small as one square foot from an altitude of 65,000 feet with a 24-hour station time and 3000 nautical mile range.[28]

While this UAV is not a space based asset, it is enabled through space based communication systems. The combination of space based sensors and air-breathing UAVs will give commanders a Near Real Time (NRT) targeting capability unlike anything they have had in the past. With the Mobile Common Ground Element (MCE), the UAVs will be able to deploy to support the operational commander and transmit that data down to tactical commanders if necessary.

The intelligence and command and control architecture must change to keep pace with the information provided by these new systems. I will focus on the brigade architecture both current and future. The size of a current U.S. brigade most closely approximates an AAN proposed strike force element of 5000 soldiers.

A current brigade has an all source fusion center (ACT) attached to it. They are able to fuse data from organic assets and pass it on to higher headquarters. They do not have an All

Source Analysis System Remote Work Station (ASAS-RWS). The brigade has no exploitation or imagery production capability. The Multiple Subscriber Equipment provides the data link at a maximum speed of 16 kbps from higher headquarters and to battalions within the brigade. This is inadequate for passing imagery data at the speed necessary to keep pace on the future battlefield.[29]

By the year 2010, this same brigade's capability to receive and assimilate data will significantly improve. The brigade will have direct access to Global Hawk products using ASAS-RWS. Data transfer will improve to 30 kbps from brigade to battalion and 15 mbps from division to brigade.[30]

Improvements in the systems necessary to transmit this information will combine space, air, sea, and ground systems into a communications network. These networks will link strategic, operational, and tactical commanders throughout the world. The space backbone of this network will come from high and low capacity satellite systems throughout the force.

High capacity systems will link the theater to the continental United States through the MILSTAR satellite using the Secure, Mobile, Anti-jam, Reliable Tactical Terminal (SMART-T). The Ultra High Frequency Follow On (UFO) satellite constellation will support the operational and tactical levels.[31]

These systems linked with a wide area network will provide the bandwidth and global reach to support the operational and tactical commander. Without these space based communications systems, it is highly unlikely we can fully support the commanders down to the tactical level.

ANALYSIS

In the Battle of Little Round Top in 1863 the principles of dominant maneuver and precision strike were exercised allowing an inferior force to win. Targeting was done through the eyes of the artillery battery commander holding the dominant terrain. Precision strike was accomplished using the technology of the day, Perrot rifled artillery, and intelligence passed on using semaphore flags. Battlespace was defined in terms of hundreds or thousands of yards.

Future battles will define battlespace in terms of hundreds of miles. Precision strike will be accomplished through systems that can strike hundreds of miles with pinpoint accuracy. Dominant maneuver will be accomplished over hundreds of miles in minutes not hours or days. All of this will be accomplished within a command and control structure that will provide commanders with near real time situational awareness.

All of the capabilities described above can be traced to space based enablers: precision strike weapons, satellite sensors, and global communication systems. The crosswalk of USSPACECOM's vision describes how space is a critical link between Joint Vision 2010 and Army Vision 2010.

If the premises described within AAN are true, then current capabilities envisioned through precision strike and dominant

maneuver must be pushed to smaller more mobile forces. This force must be capable of seeing and maneuvering throughout an extremely large, and potentially complex, battlespace. Information superiority must be maintained for this concept to be accomplished.

Systems such as Discoverer II and Global Hawk, when coupled with a responsive command and control architecture, will enable commanders at all levels to maintain complete situational awareness. Both of these systems have space based enablers. Without the space based communication links or satellite sensors, future forces will not have the complete battlespace awareness needed to accomplish missions projected for AAN forces.

Our critical link for future forces will not be our ability to gain information superiority, it will be our ability to rapidly share information throughout the battlefield. Developing new sensors without the associated command and control assets to assimilate the data and provide it to commanders at all levels is a waste of valuable resources and time.

The continued development of satellite communications systems must be a priority for the DOD to support AAN forces. Our dependence on celestial communications will grow as we develop more complex sensors and command and control systems

requiring more bandwidth. This thirst for bandwidth will continue to drive us to space based assets. Our ability to conduct precision strike and dominant maneuver will be directly linked to our space based communications backbone.

At this point we must also consider second order effects of space based sensor capabilities pushed to the tactical level. The precision strike capability provided commanders would reduce the logistical burden forced on commanders during WWII. The ability to strike critical high value targets at all levels, tactical through strategic, reduces the need for massed ammunition stockage levels.

A smaller AAN force must not be weighted down with a large logistical tail. The massed artillery and aerial attack used in WWII can not be sustained by a smaller hybrid AAN force. The use of brilliant munitions and indirect systems that require pinpoint targeting will reduce the number of rounds used and the number of delivery systems required to deploy. Without space based sensors, navigational aids, and communications this cannot be achieved.

A second aspect of precision strike enabled through space is the reduction of collateral damage. During WWI and WWII the use of massed attacks laid rubble to the battlefield. If forced to turn to massed attack because of a lack of detailed targeting information, we would reduce our ability to conduct rapid

maneuver critical to AAN forces. If you consider the rubble created by massed strikes from tactical, operational, and strategic attacks, the affects could bring maneuver to a halt. This affect could be even more significant if enemy forces move toward complex terrain such as mountains and urban areas.

Fighting a small AAN force provides unique capabilities and challenges to the commander. As we push more and more information to the tactical level we risk putting commanders into information overload. Considering the size of the future battlespace and the potential capability to see that entire area from space, the number of potential targets could be staggering.

Considering the potential thousands of targets, the Decide, Detect, Deliver, Assess targeting methodology will be critical to successful operations. Commanders must have a thorough understanding of the enemies High Value Targets and focus his intelligence assets. Information superiority cannot mean that all targets are found all the time and attacked. Critical targets must be found, attacked, and then exploited. Unless space based sensors are focused and aligned with the commander's concept of the operation, commanders could be easily overloaded with information.

Finally, automation must allow for the rapid integration of potentially thousands of targets. Systems such as ASAS-RWS and the Advanced Field Artillery Tactical Data System (AFATDS) are

the first step in this process. AFATDS is the fire support communities automated target processing system.

The ASAS-RWS provides the automated capability to translate raw data into intelligence answering specific Priority Information Requirements (PIR). Those PIR may be specific targets which can be digitally transmitted to fire support assets via the AFATDS. This combination of intelligence and fire support automation will allow commanders to synthesize the high number of targets acquired through space based sensors.

CONCLUSION / RECOMMENDATIONS

The use of space will continue to grow as we move into the 21st Century. Space based sensors and communication can be one of our greatest capabilities and at the same time one of our most significant vulnerabilities.

We must develop space systems that are flexible enough to support the full spectrum of conflict from Small Scale Contingencies (SSC) to Major Theater War (MTW). These systems must be capable of supporting all levels of warfare, strategic, operational, and tactical.

Given the speed required of AAN forces the need for real time information will be critical. Our ability to provide that information will depend on space based systems. Given the tactical situation, we must be able to rapidly push this space based information to the tactical or operational levels to facilitate dominant maneuver and precision strike.

Theater commanders must be given the capability to allocate space based assets just as they do current ground and air capabilities and forces. This may require the capability to task space based sensors and communications assets at the operational or even tactical levels. Given the ability of AAN forces to rapidly deploy, a small force may be fighting simultaneously at the tactical level with strategic

implications. This force should then have immediate access to space based assets giving the commander information superiority.

The increased dependency on space opens a critical vulnerability to U.S. forces. Space assets, and their associated links, are vulnerable to direct attack, jamming, or interception. It is critical that we develop redundant means of launching new satellites if necessary.

Just like any system, knowledgeable trained personnel are the keys to their use. We must incorporate space training into all joint curriculums. In addition, we must increase our knowledge within all of the branches. The Army must have space experts able to advise land component commanders on the best utilization of allocated space resources. Space cannot be viewed as an Air Force issue, it is a joint issue with significant implications to all Services.

Theater commanders must have the expertise within their staff to properly apportion and allocate limited space based assets. Just as we allocate air and artillery assets there will come a time when the same type of decisions will be made about space based sensors and communications capabilities. The concept of weighting a main effort with information capabilities may be in our future. That main effort may very well be a brigade size element fighting a battle with operational and even strategic consequences. Because of this, we must develop the

means to push critical space based capabilities to the operational and tactical commanders.

The integration of intelligence, communications, fires, maneuver, and bold leadership won the Battle of Little Round Top in 1863. As we move into the 21st Century we will inevitably fight more Little Round Tops. Space based intelligence and communications supporting precision strike and dominant maneuver will help win the next Little Round Top. It will take bold leadership today to provide these tools to future Warrens and Chamberlains.

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ENDNOTES

[1] U.S. Department of the Defense. Joint Vision 2010, (Washington D.C.: U.S. Department of Defense, 1996), 10-12

[2] ibid.,17.

[3] Ibid.,20.

[4] Ibid.,21.

[5] Ibid.,22.

[6] Ibid.,24.

[7] Ibid.,16.

[8] U.S. SPACECOM. Long Range Plan, Implementing USASPACECOM Vision for 2020, (Washington D.C.: U.S. Space Command, 1998), 2-3.

[9] Ibid.,6.

[10] Ibid.,8.

[11] Ibid.,10.

[12] Ibid.,12-13.

[13] U.S. Department of the Army. Army Vision 2010, (Washington D.C.: U.S. Department of the Army, 1996), (UA 23 .A511 R23 1996), 10.

[14] Ibid.,12.

[15] Ibid.,13-14.

[16] Stevens, Phillip H. Artillery Through the Ages (New York, NY.: Fanklin Watts Inc., 1965), 41-43.

[17] Smith, Samuel S. The Battle of Trenton (Monmouth Beach, NJ.: Philip Freneau Press, 1965), 27-31.

[18] Stevens, Phillip H. Artillery Through the Ages (New York, NY.: Fanklin Watts Inc., 1965) 76-78.

[19] Bailey, J.B.A. Field Artillery and Firepower (New York, NY.: The Military Press Oxford, 1989), 134-139.

[20] Ibid.,138.

[21] Ambrose, Steven E. Citizen Soldiers The U.S. Army from the Normandy Beaches to the surrender of Germany June 7, 1944-May 7, 1945. (New York, NY.: Touchstone Books, 1997), 80-89.

[22] Department of the Army, Knowledge & Speed, The Annual Report on The Army After Next Project to the Chief of Staff of the Army, (Washington D.C.: U.S. Department of the Army, 18 July 1997), 15-16.

[23] Ibid.,13.

[24] Ibid.,16.

[25] The ideas in this paragraph are based on remarks made by MG Robert Scales Army After Next lecture, Carlisle Barracks, PA, U.S. Army War College, 14 January 1999.

[26] Dr. David Whelan, "Discovery II Brief to Industry." 28 June 1998. Available from http://www.laafb.af.mil/Special Interest/disc2/Library.html. Internet. Accessed 31 December 1998, 3-4.

[27] Ibid., 11.

[28] Scott Cooper, "Global Hawk makes public debut at rollout." Available from http://www.allison.com/allison/magazine/97/03/global-hawk.html Accessed on 3 January 1999.

[29] "Operational Imagery Architecture Draft." USAIC& Fort Huachuca, 20 September 1998, 14.

[30] Ibid.,19.

[31] Jay Latham, "Transmission Technology" Class given on 2 Februàry 1999, USAWC, Carlisle PA.

BIBLIOGRAPHY

Ambrose, Stephen E. Citizen Soldiers The U.S. Army from Normandy Beaches to the Buldge to the Surrender of Germany, New York, N.Y.: Touchstone Books, 1997.

Antal, John F. The Ascendancy of Fires, Strategic Research project. Carlisle Barracks: U.S. Army War College, 1998, 17pp. (AD-A346267 c.2).

Bailey, J.B.A. Field Artillery and Firepower, New York, N.Y.: The Military Press Oxford, 1989.

Bergman, Kenneth R. "Space and the revolution in Military Affairs." Marine Corps Gazette May 1995, 58-60.

Cooper, Scott. "Global Hawk makes public debut at rollout." Available from http://www.allison.com/allison/magazine/97/03/global-hawk.html Accessed on 3 January 1999.

Goure, Daniel and Christopher M. Szara, Air and Space Power for the New Millennium. Washington, D.C.: The Center for Strategic & International Studies, 1997.

Griffin, Gary B. "Future Foes Future Fights." Military Review, Nov 1994, 56-60.

Hamon, Dale R. "Space and Power Projection." Military Review, Nov 1994, 61-67.

Helt, Paul J. The effects of Integrated Space Support node on Theater Air Operations, Wright-Patterson Air Force Base.: Air Force Institute of Technology. 1995,(UG 635.34 TH H24).

Joslin, Robert E. "Land, Sea, and Space." Marine Corps Gazette, May 1995. 63-65.

Latham, Jay. "Transmission Technology" Class given on 2 February 1999, USAWC, Carlisle PA.

Scott, William B. "Strike to Include U-2, AWACS, JOINT-STARS" Aviation Week and Space Technology, 11 March 1996, 56.

Smith, Samuel S. The Battle of Trenton, Monmouth Beach, N.J.: Philip Freneau Press, 1965.

Stevens, Phillip H. Artillery Through the Ages, New York, N.Y.: Fanklin Watts Inc., 1965.

U.S. Army Intelligence Center & Fort Huachuca. Operational Imagery Architecture Draft, 20 September 1998.

U.S. Department of the Army. Army Vision 2010. Washington D.C.: U.S Department of the Army, 1996. (UA 23 .A511R23 1996)

U.S. Department of the Army. Knowledge & Speed, The Annual Report on The Army After Next Project to the Chief of Staff of the Army. Washington D.C.: U.S. Department of the Army, 1997. (UA 24 .A551996/97 c.3)

U.S. Department of the Defense. Joint Vision 2010, Washington D.C.: U.S. Department of Defense, 1996.

U.S. Department of the Defense. National Defense Panel, Transforming Defense National Security in the 21st Century, Report of the National Defense Panel. Washington D.C.: U.S. Department of Defense, 1997.

U.S. Department of Defense. Defense Science Board 1996 Summer Study Task Force. Tactics and Technology for 21st Century Military Superiority, Volume 1 Final Report, Washington D.C.: U.S. Department of defense, 1996.

U.S. SPACECOM. Long Range Plan, Implementing USASPACECOM Vision for 2020. Washington D.C.: U.S. Space Command, 1998.

Walters, Daniel L. "About Using Satellites" Marine Corps Gazette, May 1995.

Weilbrenner, James M. Space based Multisoectral Imagery: Current and Future Applications and Implications to the United States Army, Strategic Research Project. Carlisle Barracks: U.S. Army War College, 1990, (AD-A 224 046).

Whelan, David Dr. "Discovery II Brief to Industry." 28 June 1998. Available from <http://www.laafb.af.mil/Special_Interest/disc2/Library.html>; Accessed 31 December 1998.

Wilson, J.R. "A Commanding View." International Defense Review. Vol 28. Jan 1995.